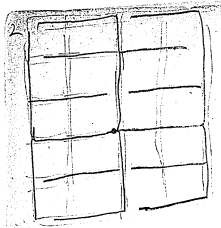
Menlo Park Notebook #7 [N-78-12-11]

This notebook covers the period December 1878-April 1879. The entries are by Edison, Charles Batchelor, and Francis Upton. Almost all of the material relates to experiments on electric lighting. Included are drawings of lamps; notes on filaments; drawings of generators, including one labeled "Edison 1st drawing"; comparisons to gas lighting costs; and calculations for an electric lighting system. There are also notes on chalks for telephones and a drawing of a Gramme machine combined with an induction coil for the telephone. The book contains 282 numbered pages and one unnumbered page.

Blank pages not filmed: 1, 76-77, 226-227, 246-275.

Missing page numbers: 233-234.



2000 1
1000 2
500 4
250 8
125 16
62 1/2 32
31 1/4 64
15 3/4 128
7 3/8 256
3 1/2 512
1 3/4 1024
7/8 2048
3/16 4096.

20
160 000 4

600

400 8
16 16
32

Dec 11 1878

3/8.

3/8. 8
8 | 3000

3'

Edison Laboratory Note Book No. 7.

Page 3.

Edison's Incandescent Electric Light.
See Edison Patents:

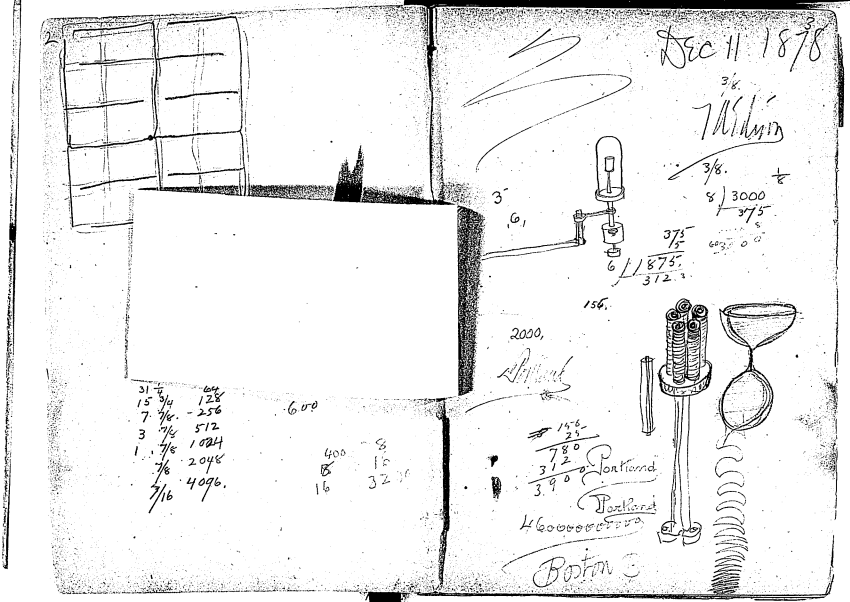
214,636 224,227
214,637 224,228
214,800 224,230

146
25
730
372
390 Portland

Portland

460000000 000

Boston


Dec 11 1878
3/8.
3/8.
3000
3.75
3.75
6.00
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372.
156.
2000,
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780
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Portland
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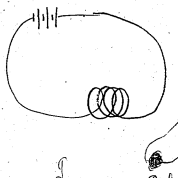
32

Dec 11 1878



1/10 of cp. 10 ti a Candle 150 ti a gas

.3. 10 calls 1

1 calls to Candle.

64

2 Cathead	6 ohm	
4	1 1/2	6/32
8	12/16.	
16	6/16.	3/32
32	3/16	
64		

Boston

Engineering apparatus

Engine

Railway

Railway Transportation

5⁻ 5⁻

25 25⁻

11 Cells .2 Ohm

2.2

Dec 13 1978

(a)

$$a = \frac{22}{2.2+5^-} = 3$$

$$= \frac{22}{7.2}$$

7.2) 22.0 (3.
216
40

$\frac{4}{5}$

$$C = \frac{22}{2.2+25}$$

15

$\frac{22}{27}$

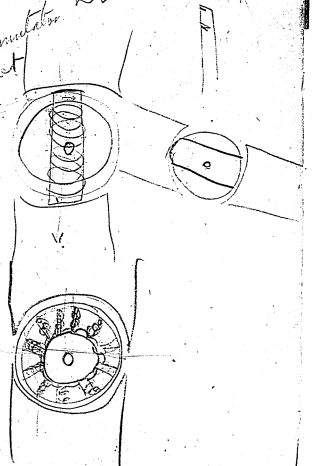
27) 22.0 (81
216
40.

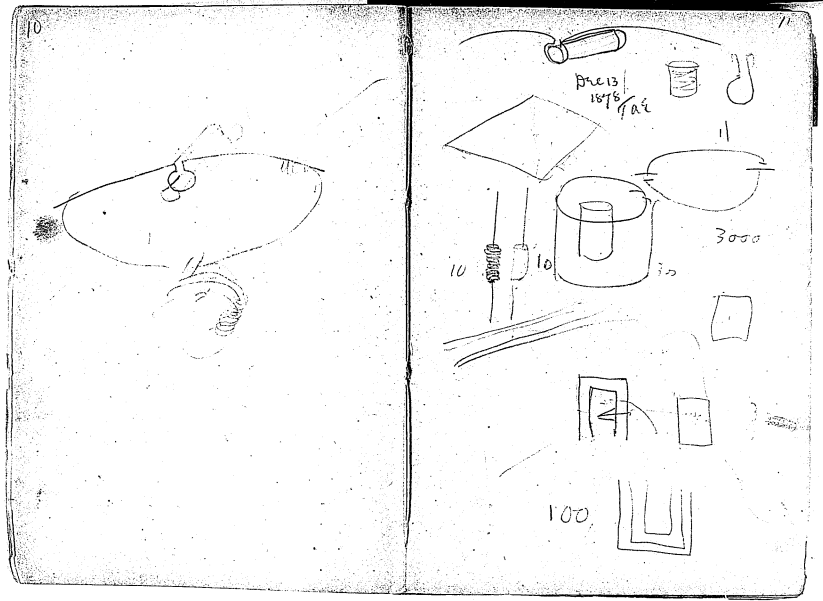
Zeus Inches

pages 9 to 27. "Dynamo Sketches" (Unimportant)

Dec 13 1875 Tai

Mem commutator




10
11
Brei3
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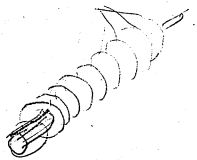
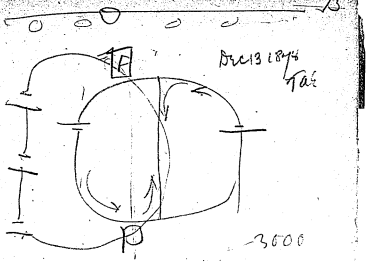
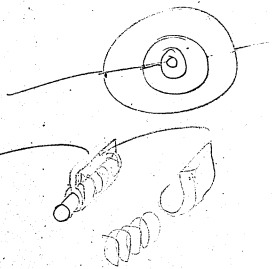
Taé
3000
10
10
100




Dec 13 1894
Tai
3000
3000



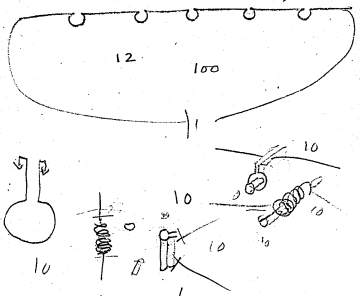
4 ÷ 40

1	1/5
2	1/10
4	1/20
8	1/40
16	1/80
32	1/160
64	1/320

10 000	
5 000	2
	4
	8
	16
	32
	64
	128
	256
	512
	1024
	2048
	4096
	5 122

2 000	
1 000	
500	
250	
125	
62	1/2
31	1/4
15	1/2
7	1/2
3	
1	1/2
	.62
	81
	15

Dec 18 1878 TAS



10 000 — 2 000
5 000 — 1 000

1120600 / 6 / 200

6

2

$\frac{1}{30}$ ll pr min

1120 / 196000 / 176 / 1600 / 4

11200
8400
7600

1=1=

Dec 13 1878 Fri

$C = \frac{e}{r}$ $\quad e = \frac{C}{r} = \frac{25}{30} = .83$ $\quad e = \frac{5}{2} = \frac{50}{4} = 12.50$

50

30 / 25.00 / 0.83

25

30

50 / 2.50 / 0

1 Ton Coal 10000

340 lbs. 10000 70000

6

5 ft = 15 cubic yds 60 min 900

70000

5 : 900 70000 63000000

6 / 1260000 / 210000

210000

8

30000/ 39[illegible]

Electric Light Dec 17 1878

~~2340~~
~~1340~~
~~9.00~~ Coal gas &c

~~10000 ft. gas 40 lb coke~~

1300 lb coal = 10'000 ft gas 1 H.P. from gas engine
= 2'000 gas lights
= 30'000 candles
= 650 horse power

650 horse power = at 600 candles per H.P. = Jablochkoff candles
390.000 or 13 times more than Gas.

Taking into consideration the consumption of carbon as three as much as H.P. in Tab. Candle it would be 4⅓ cheaper than Gas

Over

77.3 H.P.

42 = 1 H.P. 6300
58500

Electric Light

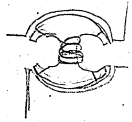
Dec 14 1898

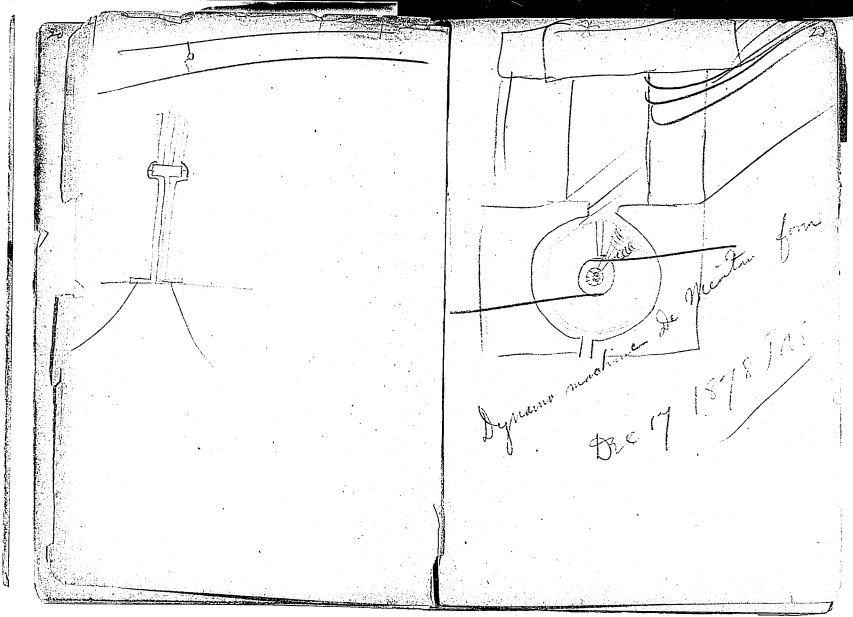
We get 6 Lights per H.P. P.

90 Can. per H.P we should

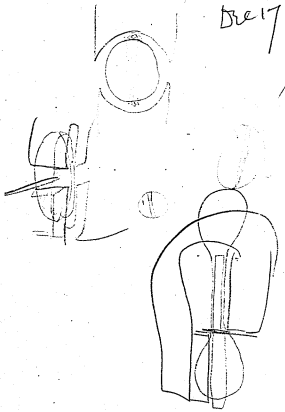
have 58500 candles

~~Shows Facility 1 H.P~~




Dynamo machine St Mentin from
Dec 17 1878

Dec 17 1978
Tas



27

Dec 17 1878
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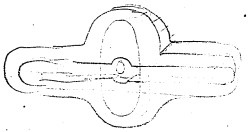
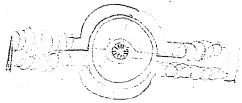


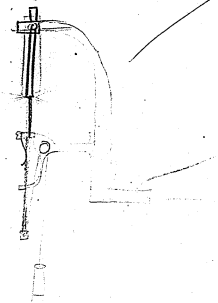


228

59

Dec 17 1879
TAS

Shuttle Carrier



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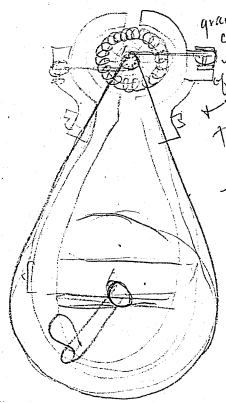
31

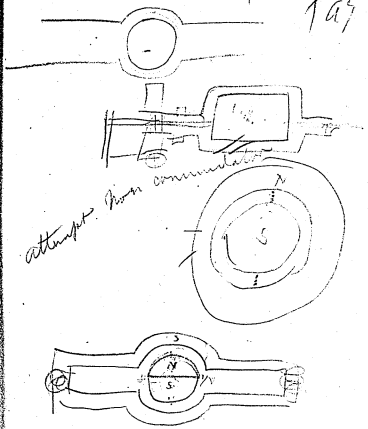
Dec 17 1878

Jae

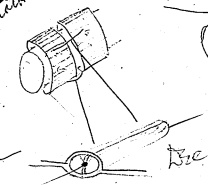


gramm Morph
combined with
Sulphate Cord
of Carbolsulphine
+ Metropolitane
Tartrate

Dec 19 1878
TAS



Commutator



Dec 17 1878.
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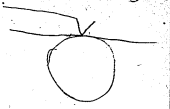
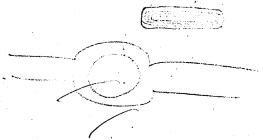
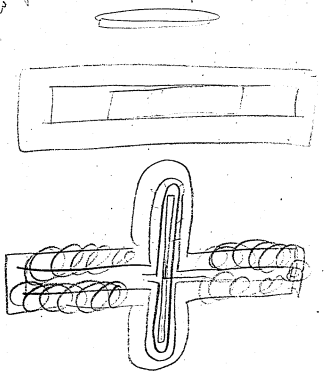


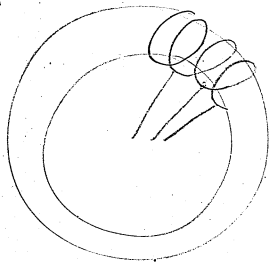


Siemens form · Dec 17 1878/168



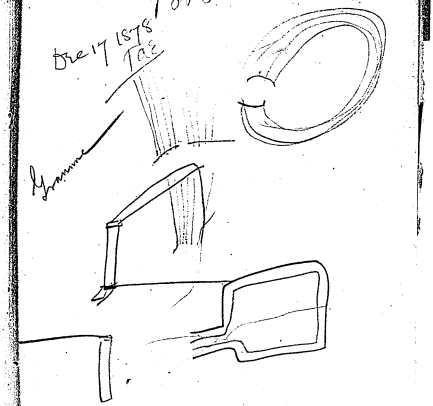
June 17 1872
Fri

Gemmine ring



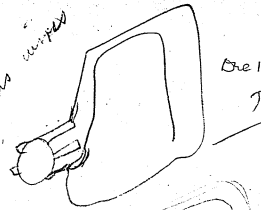
.002 cross wires
.001 " "

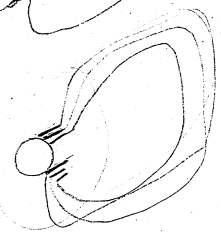
Dec 17 1878
TAS



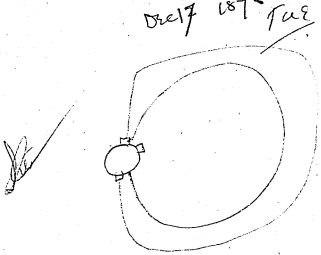
Siemens wipes

Dec 17/1878
JAE

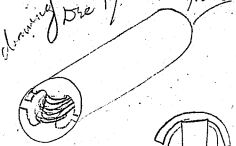


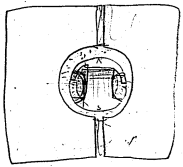


Dec 17 1874



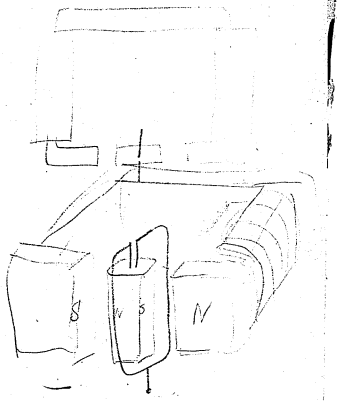
Edison at Glenmont June 17. 1878 T.A.E

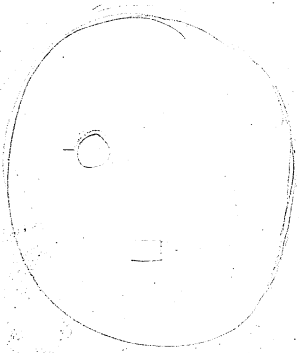




Sinuous form A

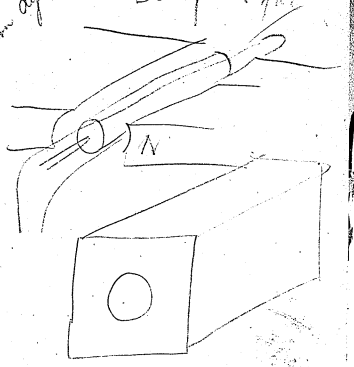
June 17 1878 Tag





Edison dynamo

Dec 17 1878



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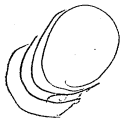

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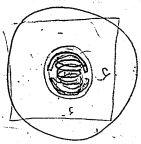
Edison dynamo

Dec 17 1878
T&S

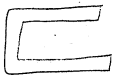
15.



3

3 feet 4 inch

2 ½



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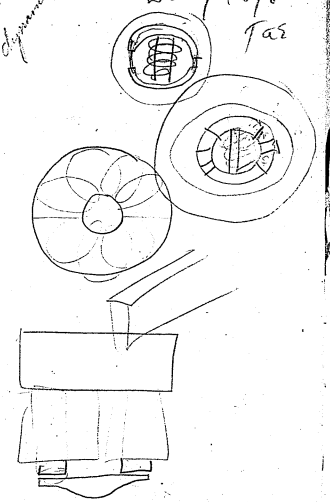
55

Edison dynamo

Dec 17 1878

Jas



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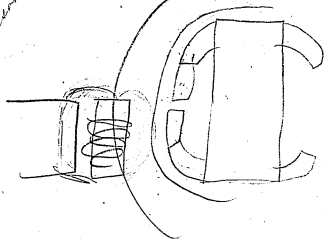
57

Dec 17 1878

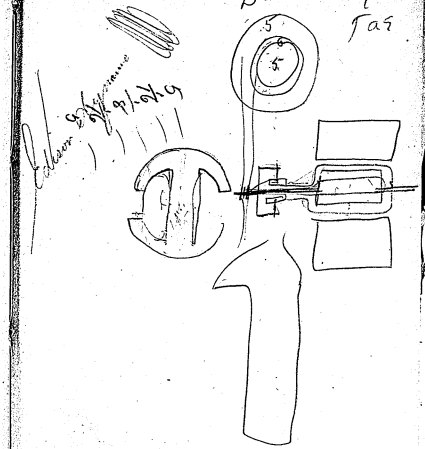
Jas

Shem dynamo



Dec 21 1878

Tas



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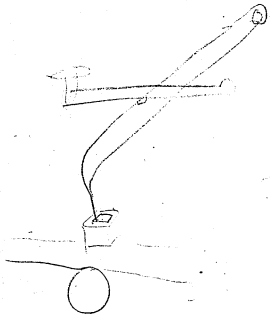
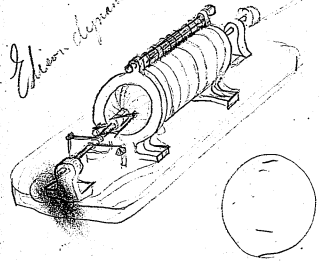


61

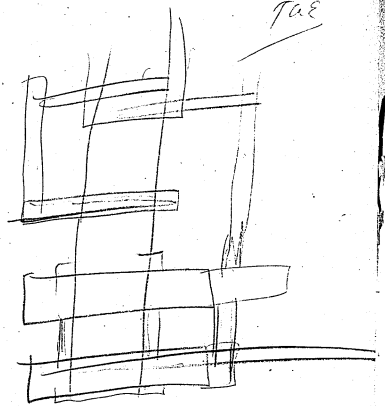
Dec 29 1878

Edison dynamo



June 29 1878

TAE



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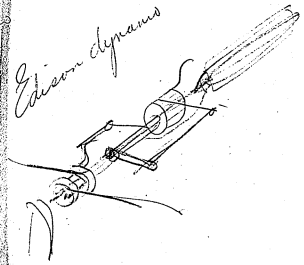
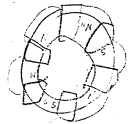
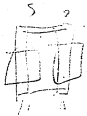
65

Dec 29. 1878.

Edison dynamo





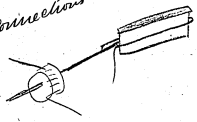


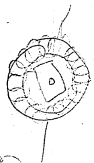
Edison's
Magnet Electric Machine

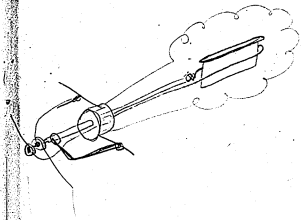
Dec 31st 1878

Charcoal Sketches

Connections







Dec 31 1878 Tap

56,

5-143,
0

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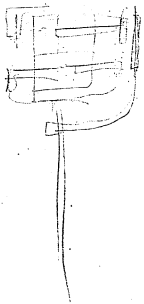

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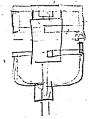

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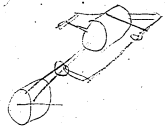

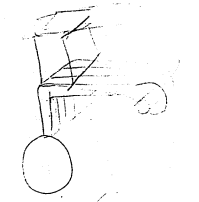

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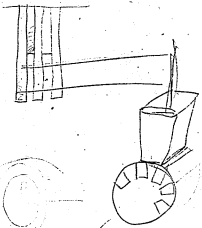

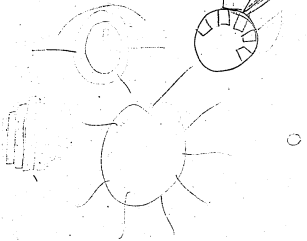

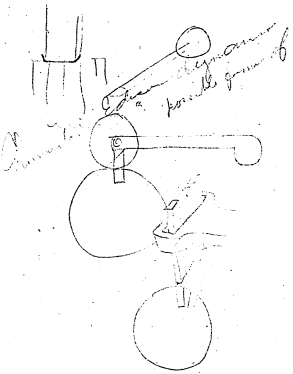

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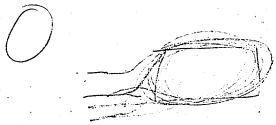

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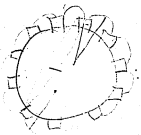

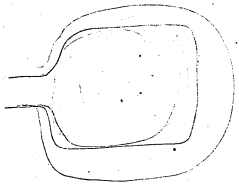

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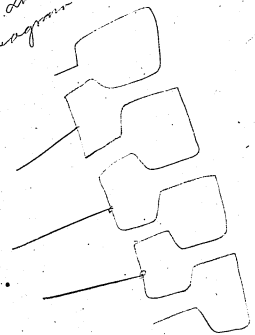
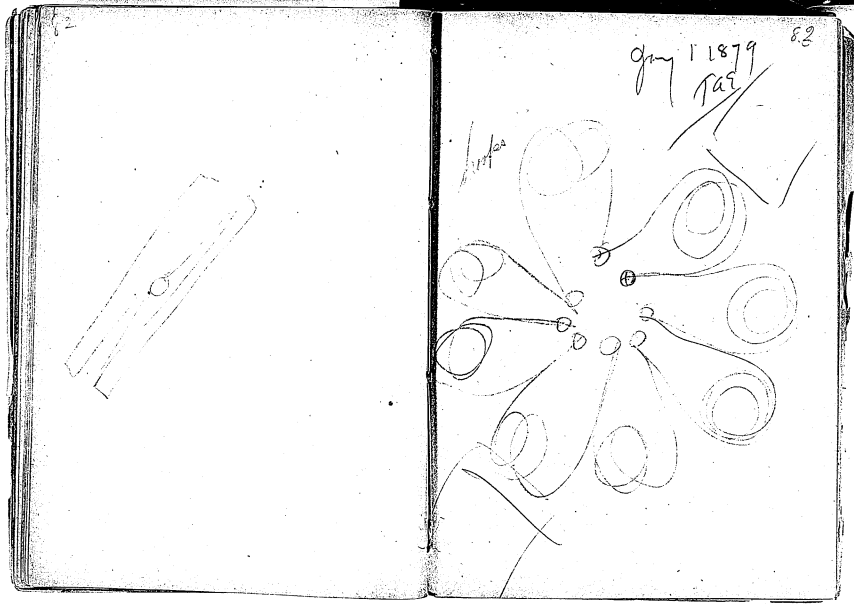
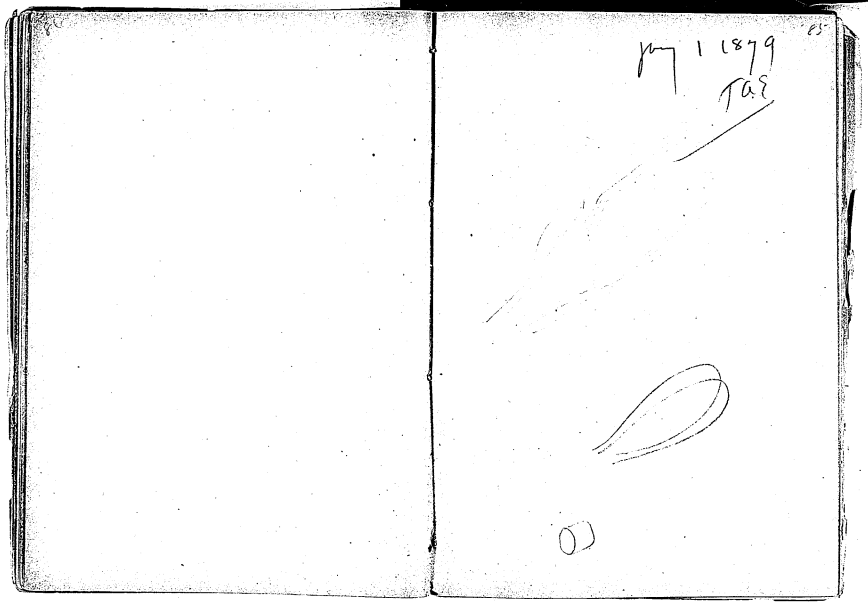
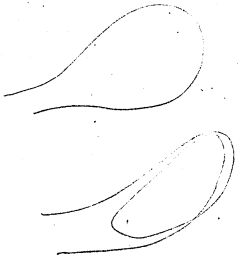
Lintes Diagram









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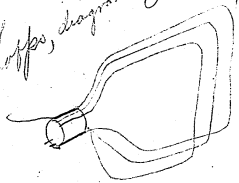
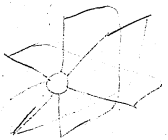
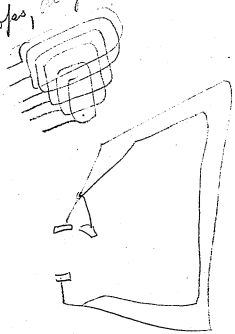




Loops, diagram of



January 1 1879

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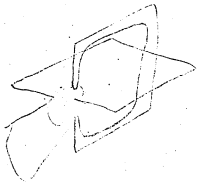
Loops, diagram of



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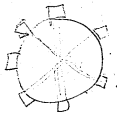

January 1 1879
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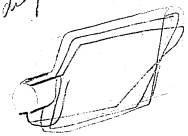
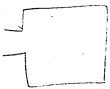
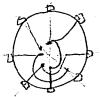
Sketches, designs &c.

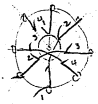




92

Graphes courses de courants





93

Graphe courants Juin 1879
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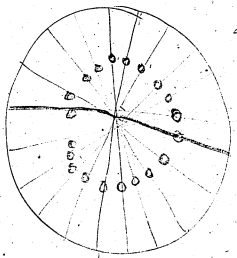
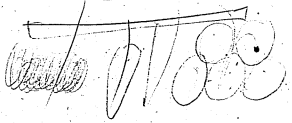
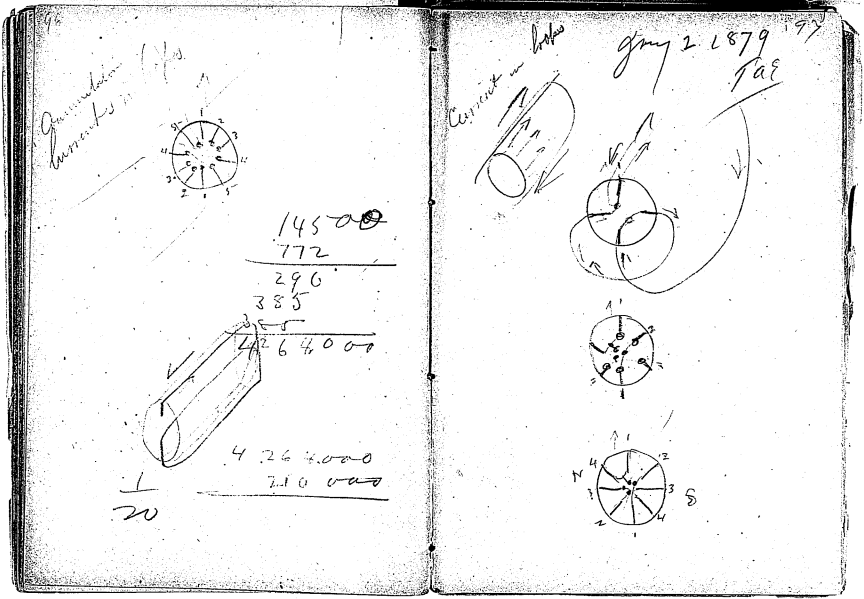
Commutator Gray 2 1879 Tail



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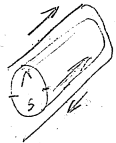

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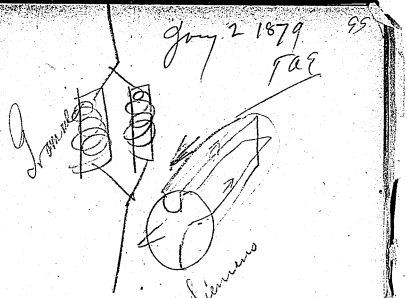
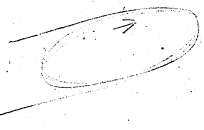
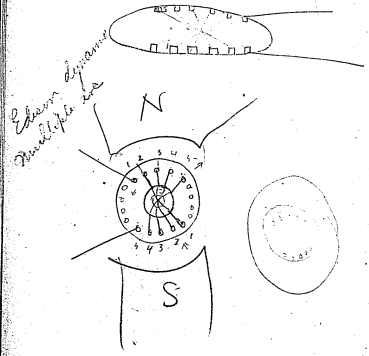




14 Z 1878 TAE



Siemens dynamo Pacinotti Lie

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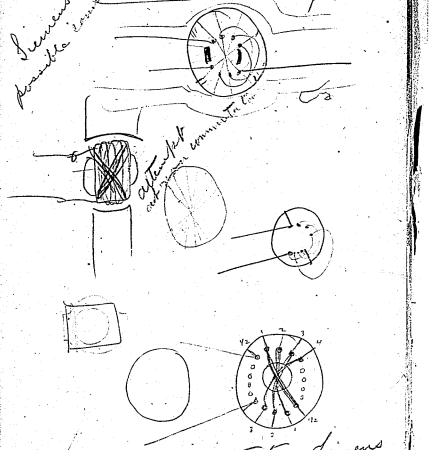
Siemens dynamo Pacinotti commutator



Commutator Siemens

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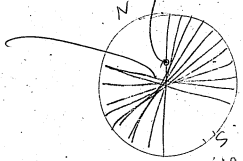
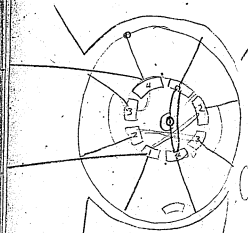
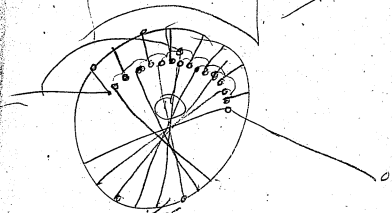


Compensation Liquor

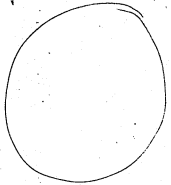


Commutateur fusible Siemens



Commutateur fusible Siemens

A Grand Potentiality.



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12 50.

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109

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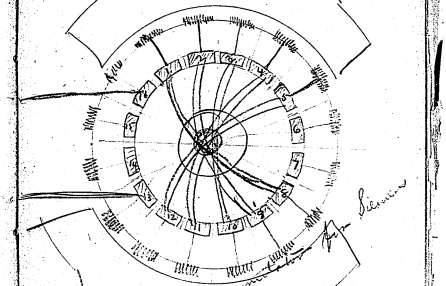

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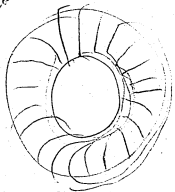
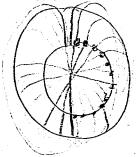
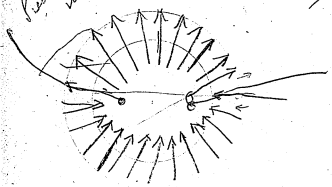
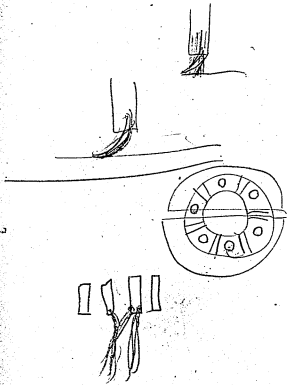




January 2 1879
TAE

Siemens armature





January 2 1879

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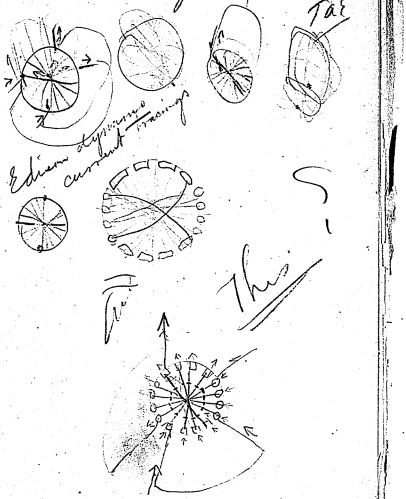

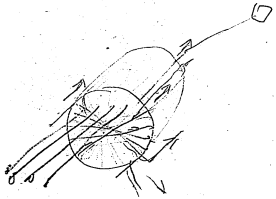

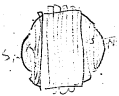

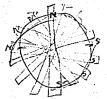

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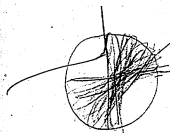

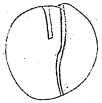

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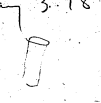

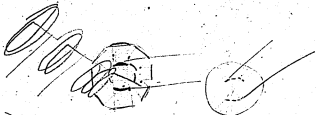

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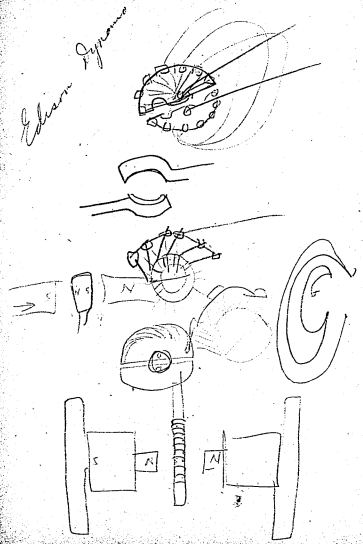
Edison Dynamo

Edison Dynamo



Jany 7 1879

3/4

Francis

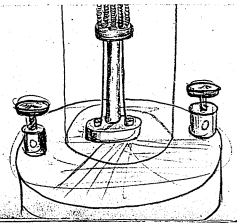
4
2
250
75
375
185 watts

William Wilcox, Jr's Book No. 7.

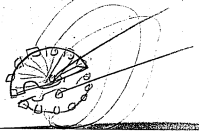
Pages 125 to 137.

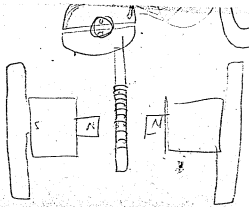
Incandescent Lamps:

Experiments :
Pl 1,003 — 127, 137
Pl 1,007 — 127, 128
Pl 1,8 — 127, 128



Edison Apparatus





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Lamp

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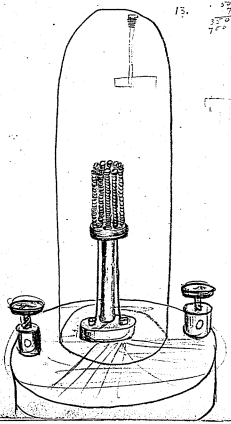
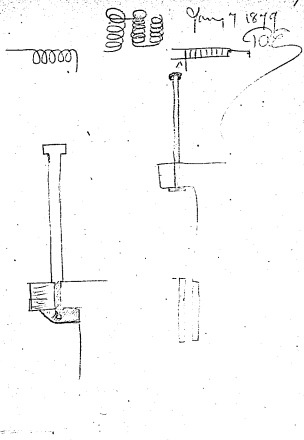


January 7 1879

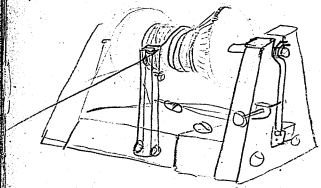
Lamp

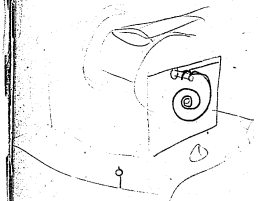


Pages 143 to 149. "Pleasant Meadows" (Dunlop's run.)

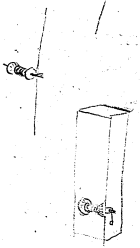
July 7 1879

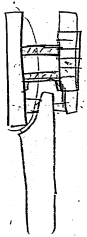
TAS



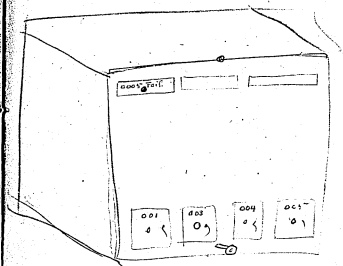


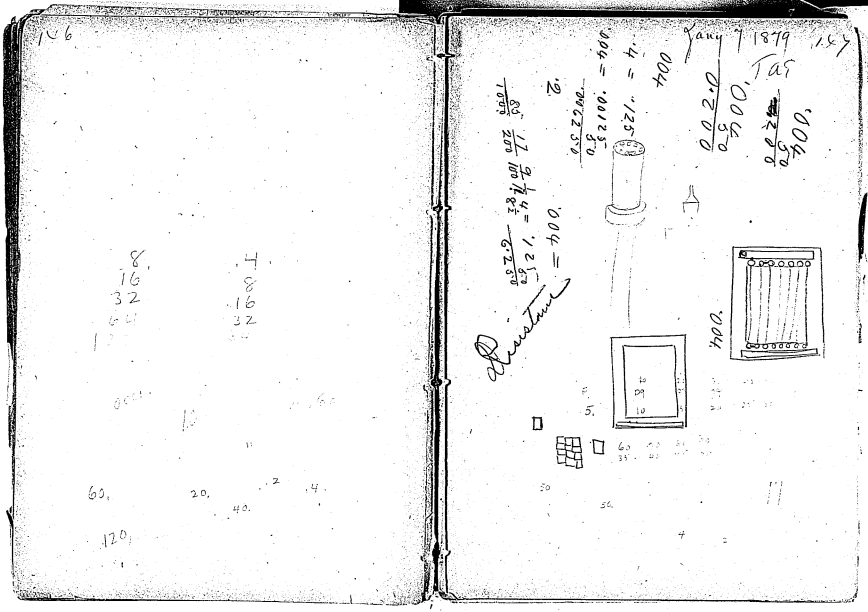
January 7 1879
Tag





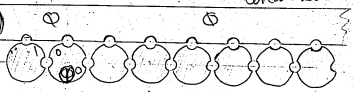
January 9 1879
TAT





Resistance Wires

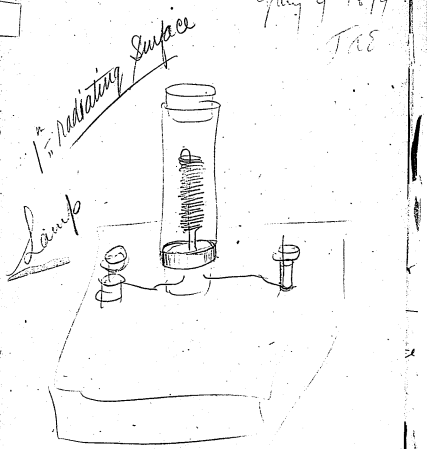
Jan 9 1899
Charles Batchelor



20 wires = 20 ohms
or in multiples are .05

Resistance

Jan 9 1879
TAE



.36
.25
1.50
1.98

.017

.017
3.14
.085
.017
.534
.020
.006
.017

.017
1.00
.017
.983
.55

55 / 20.150 / 0.36 / .12 / 100
5
330
330

20 inch length
40 " area

.018
.55 / 1.000 / 0.73 / 100
385
150

.12
.009
1.11

.73
1.24

.24
.009
.237
100

January 9 1879

Muscle .017 in long
Spinal
Sciatic .12
Number turns 55

16.
6
96
12.

.23
3.14
.92
.23
.69
7.222

.25
3.14
1.00
.25
7.85

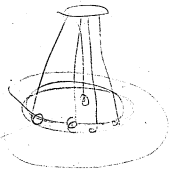
.33
3.14
1.32
.33
.99
10.362

.33
1.34
29.6

30.

.73
5
6 / 5.76 (9
4.20
16

54
12
108
54
648 (16
40
248
240
8

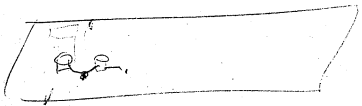


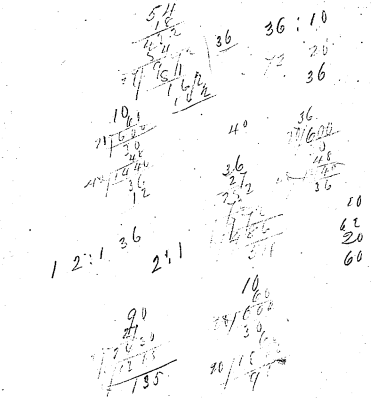
Jany 9, 1879

$$6 \overline{)576} \quad 96 \qquad \begin{array}{r} 96 \\ \times\ 6 \\ \hline 576. \end{array}$$

$$\begin{array}{r} 54 \\ \hline 36 \end{array}$$

3





Screw 16 to inch Spindle 18 Outer shaft 27

Gears · 20 · 24 · 30 · 32 · 40 · 44 · 48 · 52 · 56 · 60 · 64 · 126

Thread wanted 166

54 40-48 — 20-60

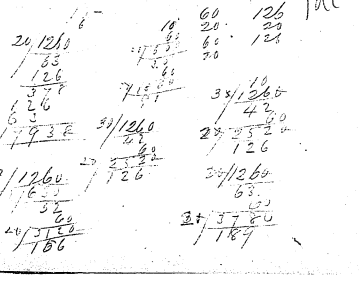
189 threads 20-60 / 20-126

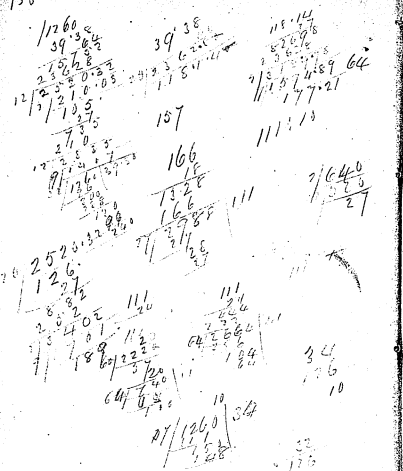
126 = 20-60 / 30-126

156 = 20-60 / 24-126

January 9 1879

TAC





Jany 9 1879 Taf

135 threads — 20-60
20-60 wheels

166 = ~~17·21 20·60 = 84·126~~

157 = 24·60·32·126

189 = 20·60·32·126

160

Question. June 9/1879 P.M.

Explain how the cells are arranged in multiple arc and what effect will they produce.

Laws. The voltaic cell indicates only the current, or as it is called the quantity of Elec. passing through it. It is only another form of galvanometer.

A number may be put in series and each one will give an equal amount of gas no matter what the surface of the platinum or the resistance in any one is. This will be only true when the current has time passing for a time sufficient to saturate all the vessels platinum electrodes with gas.

The "hindrances" to the passage of the current are two-fold. First the resistance of the water as a conductor. Secondly the opposing electromotive forces set up on the surfaces of the immersed plates.

The resistance may be measured in two ways, making it first any one inch and measuring the current, then two inches and measuring. The difference will be due to the added resistance for the greater distance. It can also be measured as by the method used by

That is to send

162 rapidly reversed currents through the water and measure the by an electro-dynamometer. This method takes for granted that the polarization is zero for such currents.

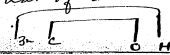
The resistance of the decomposing cells will directly be a dead loss for the current will be used in heating it. Indirectly it may be utilized for the heating of the water ~~thus making~~ makes the gas come off more readily and also warms the gas and makes its combustion better.

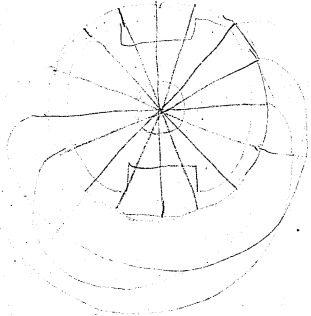
The electromotive force of a water cell when the poles are covered with H_2O is about 1.2 Daniells Sprague gives it at 1.464 Volts a Daniell being 1.079

1.464	.165541	Energy Brit.
1.079	.031004	
1.363	.134537	

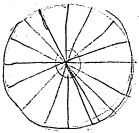
1.363 Daniells

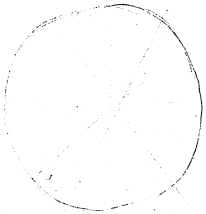
The H is carried with the current the same as a metal and thus the O will be formed at the pole connected with the + of battery and H with that of the —



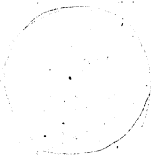


January 9 1899
Taï





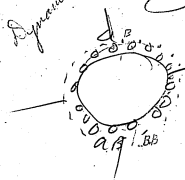
9 1879
Jat

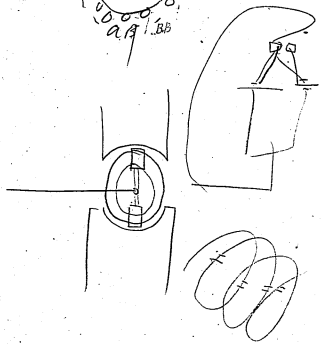


February 16 1879

A.G.E

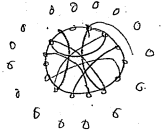
Edison Dynamo





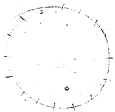
Edison Appliance

Wall

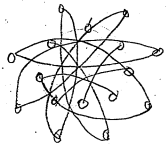


Bat

5



Edison Speziano



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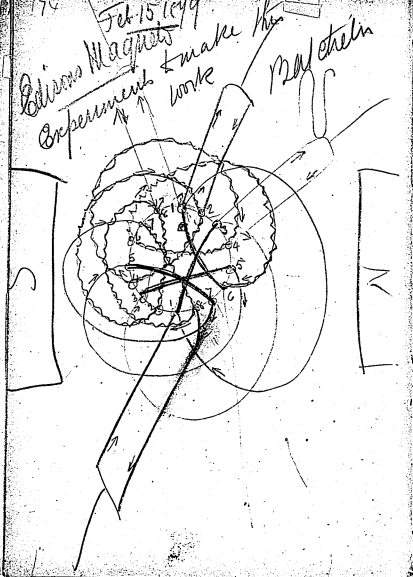
Feb 15 1879

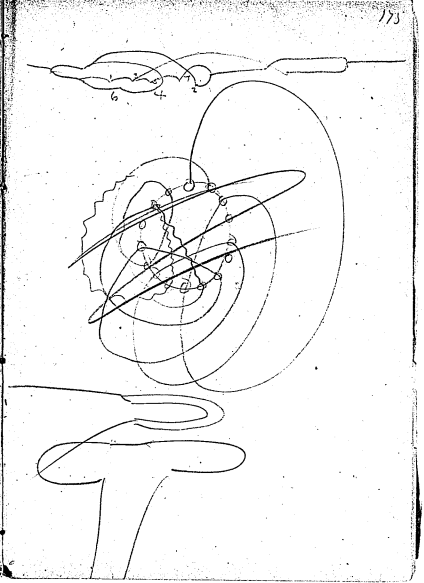
Edisons Magnets

Experiments to make his work

Rayleighs



175

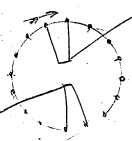


Feb 15 1849

Exp 1 page 174 Chr Balcheln

Commutator Springs Do

Exp 1



Went all round

No current except a shock at each revolution

Exp 2

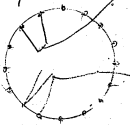
All round

~~Very slight spark~~

Slight spark,

Very little spark at Commutators

Exp 3



Went all round

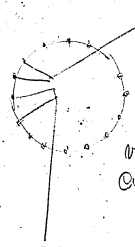
No better

about same

Exp 4

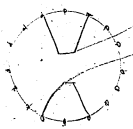
Went all round

about same

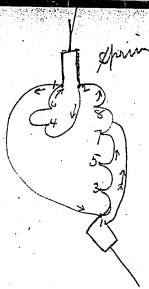


All round

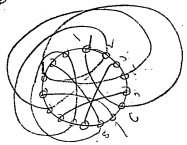
Same
slight spark
very small spark on
Commutator

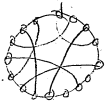


All round
same as before

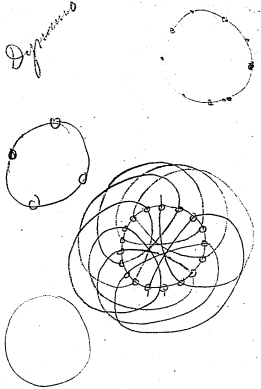


Ейлеви дуркнио





Edison Dornelles



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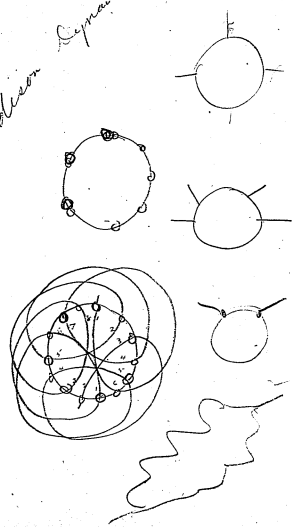
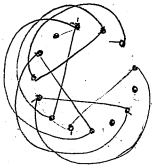
185

Edison Cyphers

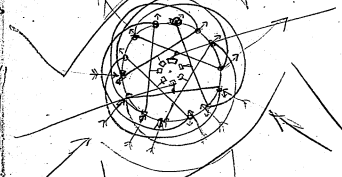


feb 1879

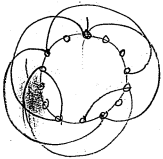
Edison Speciments

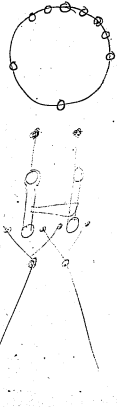


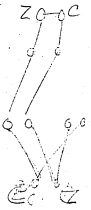
Edison Symphony
Feb 1914



Edition Leipzig



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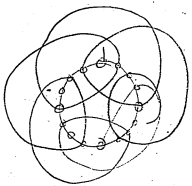
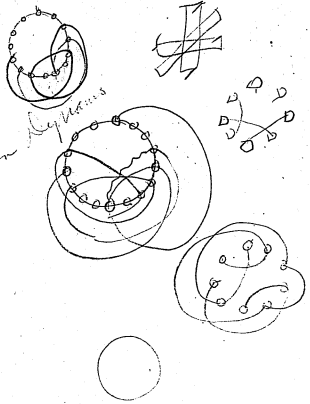
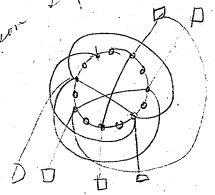
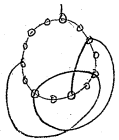



Edison Nepomuceno

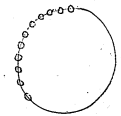
Edison Dynamo

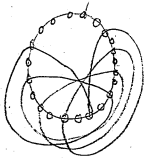


Edwin Dyson



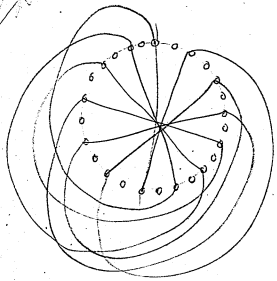
Edison Digitalino.





Dyrygent Marszałek

Eliasz



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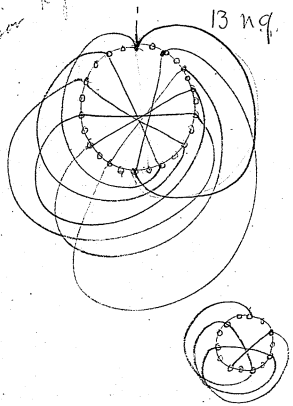
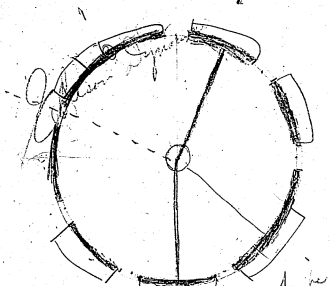
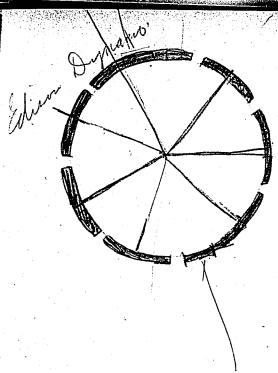
Elwin Equation

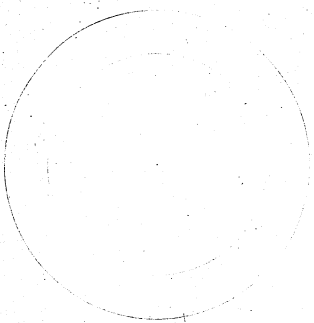
13 ng.

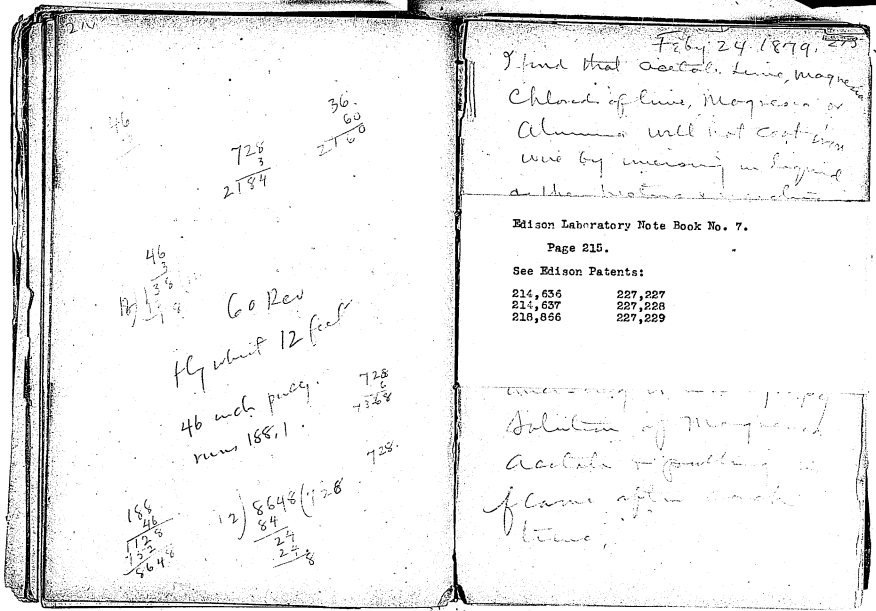




Proof that [illegible] cannot be used on the 6 commutators


Edison Dynamo





Feb. 24 1879. 275

I find that dental. Lime, Magnesia Chlorid of Lime, Magnesia or Alumina will not coat [illegible] wire by immersing in liquid and then heating [illegible]

Edison Laboratory Note Book No. 7.

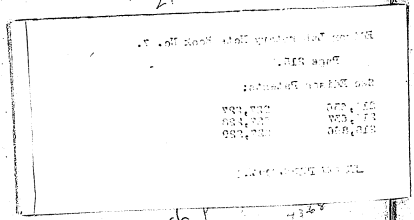
Page 215.

See Edison Patents:

214,636	227,227
214,637	227,228
218,866	227,229

Feby 24 1879. 275

I find that acetate Lime, Magnesia
Chlorid of Lime, Magnesia or
Alumina will not Coat iron
wire by immersing in liquid
& then heating & repeating
the operation many times
But acetate is a useful
Caustic - a Beautiful clear
Coating that may sometimes
be put on plaster work
immersing it in a Syrup
Solution of Magnesia
Acetate & gumming it
of Course after



36.
60
2160

728
3
2184

46

46 inch
mm 188,1

728.

188
46
1128
752
864.6

12) 8648 (720
84
24
24
0

3 ℈ chalk (precipitated)
9 grains Acetate Mercury
½ fluid ℈ Caustic Soda 1

3 ℈ chalk
5 grains Acetate Mercury
½ fluid ℈ Caustic Soda 2

3 ℈ Chalk
20 Mercury
½ fluid ℈ Na. O. 3

3 ℈ Chalk
15 grains Acetate 4
½ fluid ℈ Na O

3 ℈ Chalk
25 gr Acetate Mercury 5
½ fluid ℈ Na O.

3 ℈ Chalk
40 gr. Hg acetate
½ fluid℈ Na.O. 6

3 ℈ Chalk
100 gr. Hg Acl.
½ fluid℈ Na.O. 7

3 ℈ Chalk
9 gr. Hg Acl.
¾ fluid℈ Na.O. 8

3 ℈ Chalk
9 gr. Hg Acl.
1 fluid℈ Na.O. 9

3 ℈ Chalk
25 gr. Hg Acl.
1 fluid℈ Na O 10

9 g Chalk
1 g Na O. Mercurous Acetate sparingly soluble in water

~~The Chalk and Acetate Hg to be ground up very finely~~
Dissolve the Acetate Hg in hot water sufficient to just wet the whole of the Chalk. It must be ground thoroughly so that every part of the Chalk is wet, afterwards the Chalk is laid out to dry without heat, after drying it is put in a mortar and the Caustic Soda poured on it and thoroughly ground and allowed to dry so that it is just damp only to the touch, In this condition it is to be put into a bottle and Closed and labeled

March 17/79 J. Thomson

Pulverized the Mercurous Acetate finely in a mortar, sifted it, and mixed intimately with the Calcium Carbonate by placing layer on sieve, then a layer of thin layer of Mercurous Acetate, then layer of Calcium Carbonate, and so on, and sifted the whole [illegible] 60 sieve.

Repeated the sifting process three times, each time mixing more intimately by means of a spatula.

Added [illegible] of

Sodium Hydroxide with enough water to make the whole of the consistency of dough, ~~and~~ ground thoroughly

[Volume of Sodium Hydroxide and water 60 c.c.], then set aside to dry.

Property of U.S. Government

228

75 .75

25

6

.9
.9
1.6
1.1
.51

.51

6

1

9 10 6

V 3 3 3

3

229

1 Carbon cell

2 Volts .2 interval

40 bars 9 Volts

1.0 Intervals

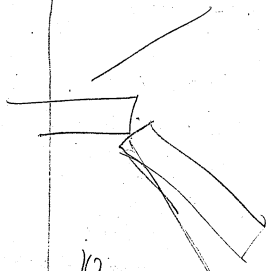
.6

$C = \frac{2.0}{1.6} = \frac{5}{4} = 1.25$

$\frac{25}{10} \cdot b_3 = \frac{75}{8} = 19 \pm$

Carbon $\frac{2.0}{.8} = \frac{10}{4} = \frac{5}{2} = 2.5$

$\frac{25}{H_2} \cdot b_3 = \frac{75}{2} = 3.7$ Energy



75
50
3750

100) 2000
20 per hour

3750
2000
7,500,000

33) 7,500 (227 hours
66
90
66
240
60/204
3.73

232

772 ft lbs
lb H_2O ?

75. saved
500 saved
3750 per lb H_2O
2000
60 | 7.500.000 ft lb per hour
1

33000 33000
60 60
1980,000 1980000

1,980000 | 7,500000
198 | 750. | 3.7
594
156 0

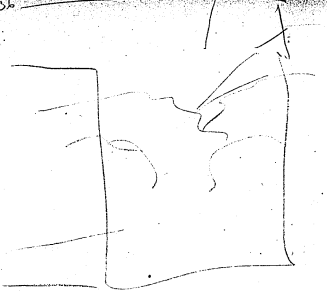
233

772
100
3300 | 77.200
66

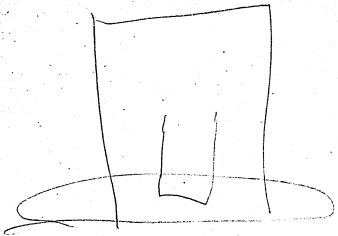
2 1/3
2000
4666

772
2000
1544
772 00
1544 00000
1980000
198 | 1554 | 7

33 000
60



200



Menlo Park Cups 1879

April 7. 2 a.m.

Leclanché cell on 100 Ohms

45° = D

---

9 a.m.

15° = D

11.30 a.m.

130

Ohm for evaporating

3–40 P.M

25° = D

4-3 P.M

15 = D

Taken off

8–40 P.M

27° = D

Balanced quickly

~~Taken off~~

Put on 100 Ohms

9-20 D = 17°

Taken off

10–10 P.M

23° = D

April 8

9–5 A.M

on all night

D = 180

Taken off

1 Daniells

4½ = D

2 Daniells

9° = D

12 M

D = 27°

on until

1–35 P.M

D = 14°

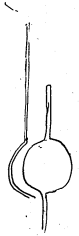
Taken off

but 5–25 P.M

17° = D

9 P.M.
10° = D

Taken up 6
May 9
15° = D
Battery charging



Pages 245 to 275." B. L A N K".

1000 -

1+1
1+1+2
2+2+4
~~999~~

Pages 276 to 284."Lamp & Dynamo Notes, &c."(Unimport

$$C = \frac{\varepsilon}{R+r}$$

$$= \frac{1}{1+1} = \frac{1}{2}$$

$$C = \frac{\varepsilon}{R+r} = \frac{1}{1} = 1$$

$$C = \frac{\varepsilon}{r} = \frac{2}{2} = 1$$

$$10\,\Omega = R$$

$$\frac{\varepsilon}{2}$$

12 inches of $\frac{9}{1000}$ wire.

4 = $\frac{4\frac{1}{2}}{1000}$

$2\frac{1}{2}$

16 —

8

16 Lights.

200 ÷ 3600

20 7 3.00 60 turns 18.00 12000.

1000. 5 10. ohms. 36. 8.00

32
64.

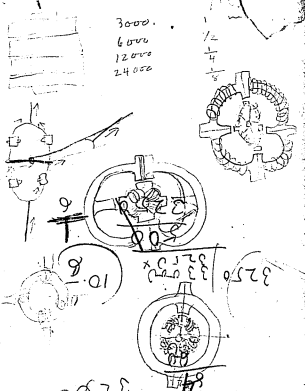
.25 = 1/4

25 2.50 14000 .25 ohm 1/25.
10 2.00
141. .2 16) 3.200 (12 1/2
16
72
64
80
80

20 24
1000. 8
192.

Either was wound on a flat spiral
space
3/8 by 1 inch. Each turn has 1 inch of wire.
5000 turns without Zircon could be put in but
with Zircon say 200 turns (12) 200 inches
now 200 inches would measure coil
say 700 ohms when unwinding it
would measure 3500 ohms —
hence there is no difficulty in making
a lamp having 2 or 3000 ohms resistance
of the wire was $\frac{4}{1000}$ it would have say
5000 ohms resistance

Dynamo Wire Dec

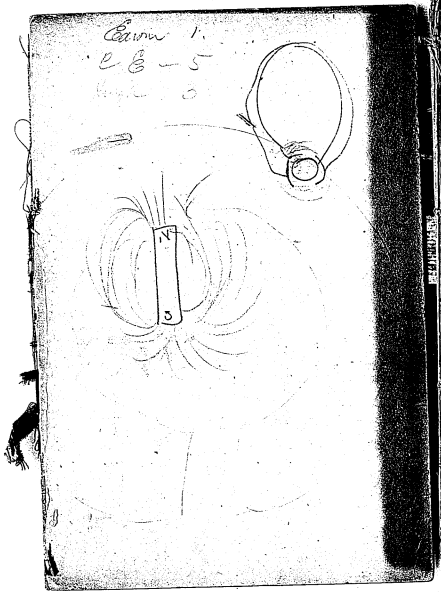


2 wire 11 inches
1000 actually measures 40 ohms

16 inch of 0 9000

or 9/1000 measures 2 ohms at temperature of the atmosphere - 62, at incandescent point it would measure 4 times more or 10 ohms - in 4 1/2/1000 it would have 8 ohms resistance, or 40 ohms at incandescent point if it was 2 1/4/1000 it would be 32 ohms, or 160 ohms at incandescing of 1/8/1000 it would 128 ohms or 640 ohms at incandescing Is this ok -

When 32 inches 1280 ohms
64 inches 2560
128 " 5120
256 " 10240 ohms


N
S